

## **Plans for BELBaR**

**BELBaR start-up meeting, 7.-8.3.2012 Lund**  
**Veli-Matti Pulkkanen, Michał Matuszewicz and Markus**  
**Olin**  
**VTT Technical Research Centre of Finland**

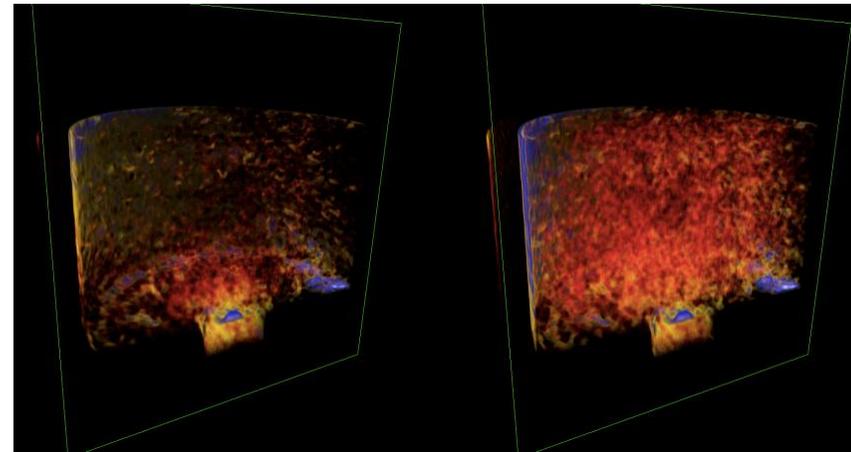
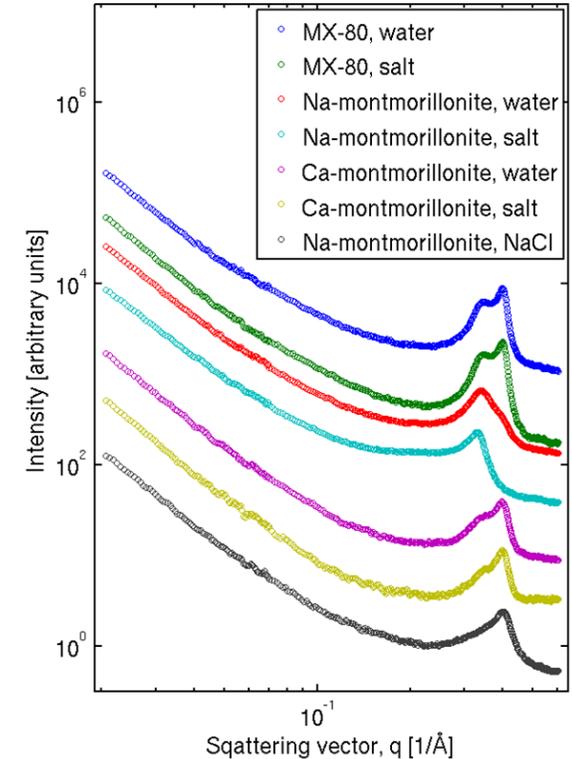
## Work packages

- WP1
  - Safety assessments: current status
  
- WP2
  - Erosion experiments
  
- WP5
  - Modelling

## Erosion experiments: background (1/2)

- Techniques used in bentonite studies in Finnish Research Programme on Nuclear Waste Management (KYT):
  - Small angle X-ray scattering, X-ray diffraction
    - microstructure: interlamellar spacing, stacks...
    - HU & VTT
  - X-ray tomography
    - density distribution in 3D
    - displacement field
    - JyU & VTT

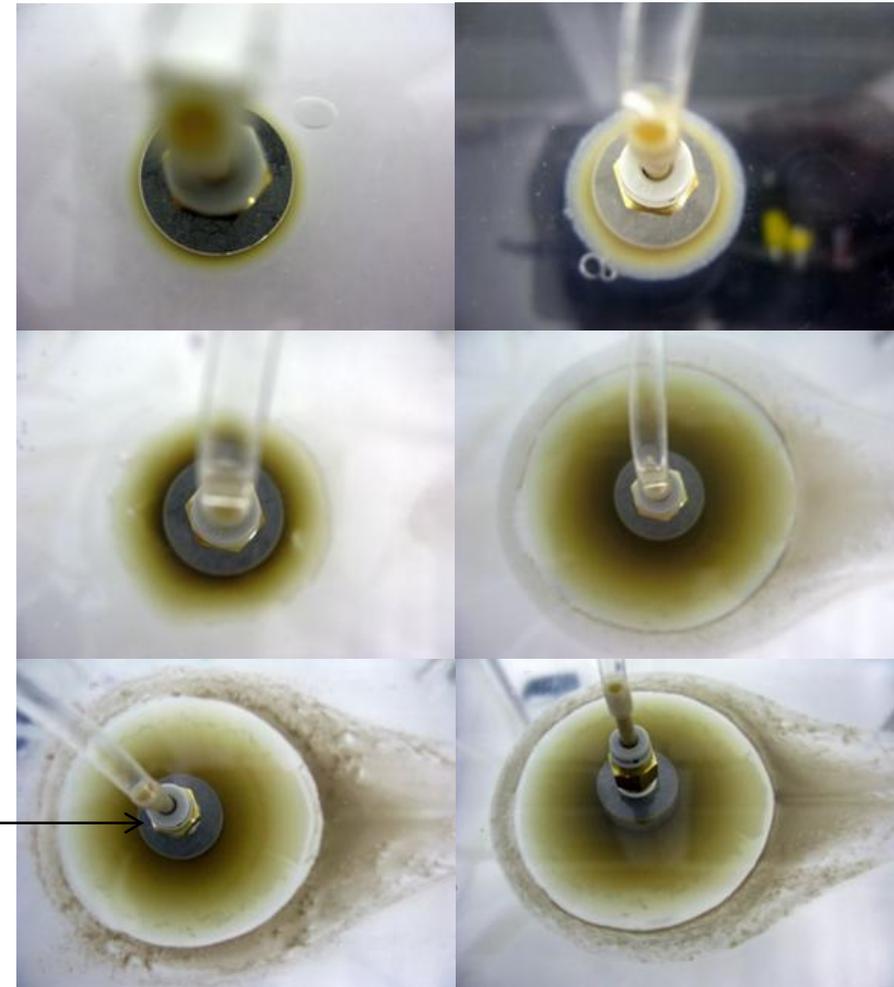
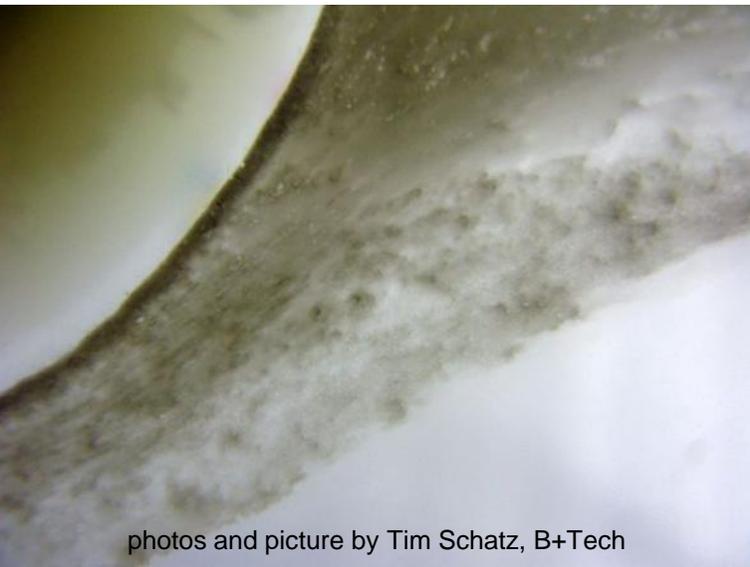
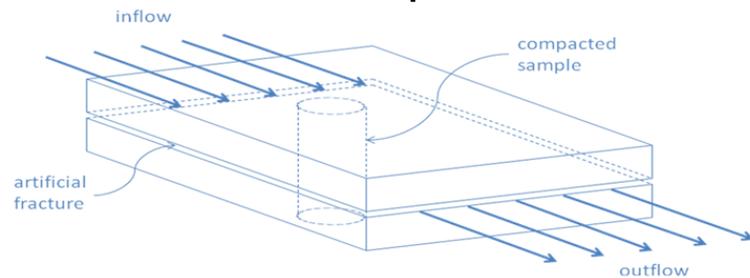
SAXS graph by Ville Liljeström, Michal Matuszewicz, Kari Pirkkalainen, Jussi-Petteri Suuronen, HU & VTT



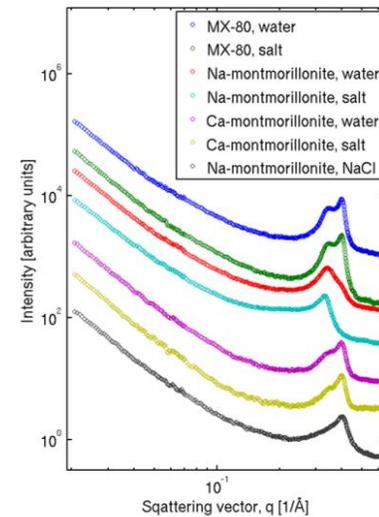
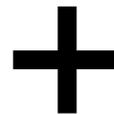
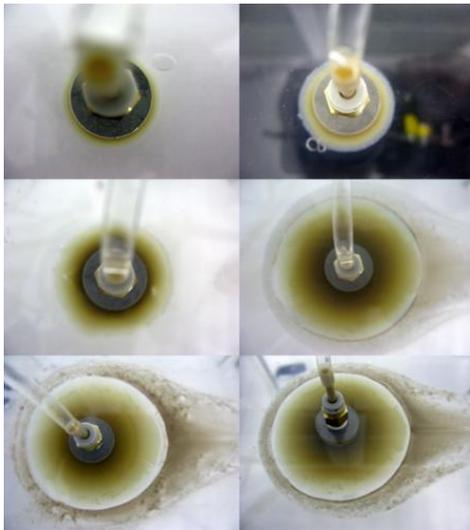
X-ray tomography pictures by Markku Kataja et. al., JyU

## Erosion experiments: background (2/2)

- Work done at B+Tech
  - glacial erosion laboratory scale experiments



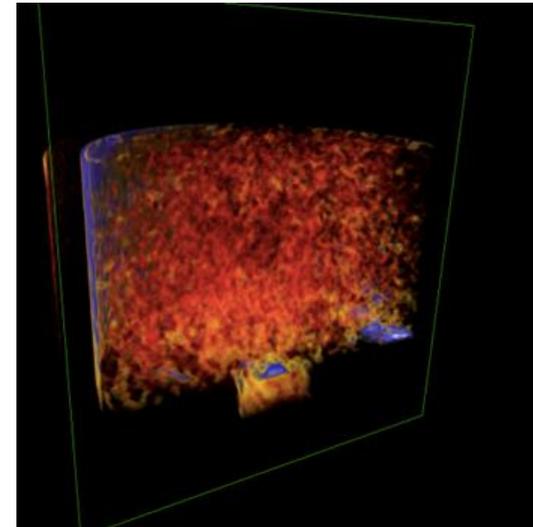
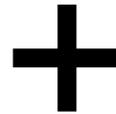
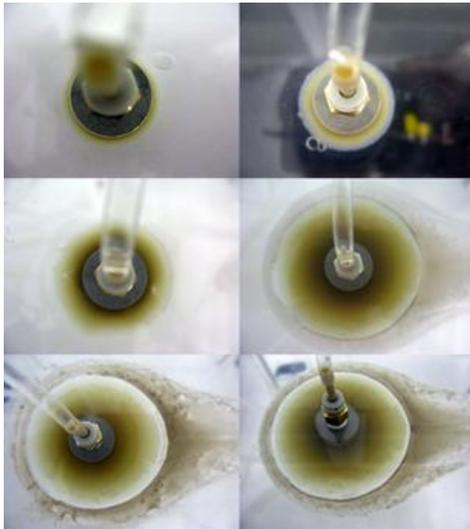
## Erosion experiments: plans (1/2)



VTT  
B+Tech  
(HU)

- information of the microstructure from solid part towards eroding edge
- planning the experimental setup carefully and preparing the samples are the keys to make this combination work

## Erosion experiments: plans (2/2)



VTT  
B+Tech  
JyU

- 3D distribution of bentonite density, displacement field of bentonite
- experimental setup mimics the B+Tech's lab experiment geometry
  - capillary tubes, ...

## Modelling plans (1/2)

- eroding bentonite: solid + gel + particles (colloids)
- model development process (solid + gel):
  1. collect the experimental evidence obtained this far
  2. choose a material model that is supported by the evidence (viscous, plastic, visco-elastic, visco-plastic...)
  3. give feedback for the experimentalists (which parameters are needed)
  4. get results from the experiments
  5. update the model if needed
  6. final model

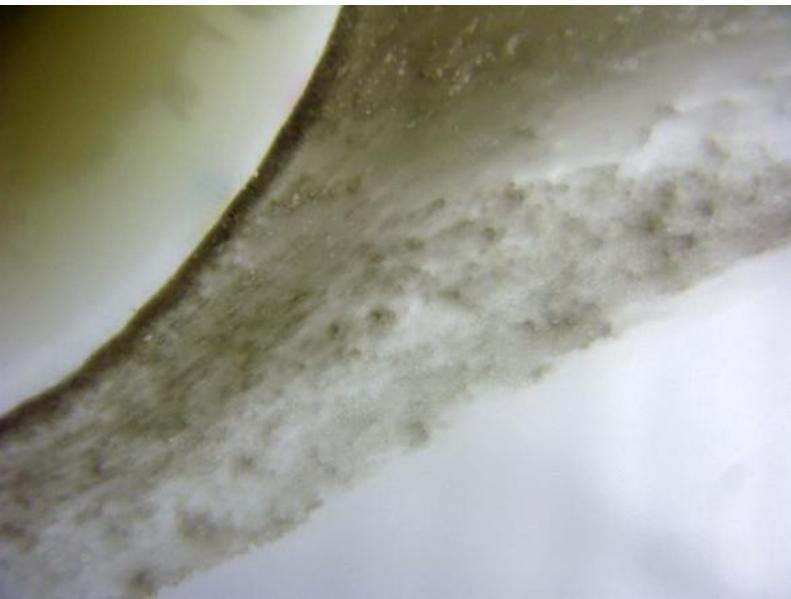
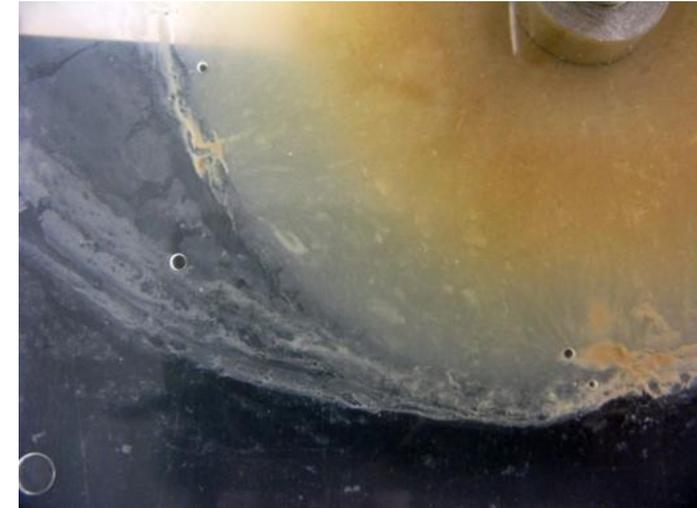


photos by Tim Schatz, B+Tech



## Modelling plans (2/2)

- Bentonite-water interface
  - Detachment of the eroded mass
    - experiments & analysis needed
  - Transport of the eroding mass (particles, colloids, ...)
  - Collaboration with KIT?





Thank you!